Sustainable Seas Expeditions
Cruise Plan Format

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May 7, 1999

CRUISE INSTRUCTIONS: May 7, 1999

NOAA Ship: McARTHUR **Cruise Number:** AR-99-XX

Cruise Title: Sustainable Seas Expeditions

Study Area: Monterey Bay National Marine Sanctuary (MBNMS)

Sponsoring Institution: NOAA's National Ocean Service (NOS), Sustainable Seas Expedition (SSE), National Geographic Society (NGS)

Cruise Description and Objectives:

The first year of the SSE program in Monterey Bay will focus on the further exploration of the local marine environment, through the use of the *Deep Worker* submersible; build upon past scientific research; and use the SSE program as a means to increase local and national environmental awareness through education.

The SSE program in the MBNMS will consist of six projects. The scientific projects will include monitoring fish populations in the no-take marine protected area of Big Creek Ecological Reserve (BCER); studying the distribution and movement of prickly sharks; diurnal migrations of mesopelagic organisms associated with the edge of submarine canyons; a brief survey of sediment flow at the dredge site near Moss Landing; and exploration by Dr. Sylvia Earle. There will be one diving education project we are calling Teacher-in-the-Sea. A local high school teacher will work in a no-take reserve to compare deep water habitats with shallow water depths characterized with SCUBA by students. In this first year of the SSE the MBNMS has chosen to build upon what resources are available in the local community. Each project has its own specific objective; however, all the projects provide important information for marine resource management.

Synopsis of Scientific Measurements: Scientists will collect and record information relating to four projects.

- Fish Assessment in the No-Take Area, Big Creek Ecological Reserve: Scientists will quantify relative abundance, species composition, and size structure of fishes relative to depth and habitat type in deepwater off BCER and adjacent unprotected areas. These data will be compared to samples taken in the Fall season with the *Delta* submersible.

- Prickly Shark Ecology: Video transects will be used at the heads of several of the major canyons in the Monterey Bay to estimate the distribution and relative abundance of prickly and other sharks. Preceding the SSE cruise, sonic tags will have been placed on Prickly sharks at SCUBA depths in the Monterey Canyon.

- Day/Night Activity Patterns of Mid-Water Fish and Invertebrates: The distribution and abundance of midwater fish and invertebrates will be assessed, comparing observations from the *Deep Worker* with those made from a remotely operated vehicle.

- Pilot study on sediment flow at the Moss Landing dredge disposal site: Processes of sediment flow will be documented with video.

Exploration by Dr. Sylvia Earle: Sylvia Earle will present unique exploration and education opportunities based on the above or separate projects. At least one day of her mission will be dedicated to exploration done in tandem with a second DeepWorker and a remotely operated vehicle (ROV) operated by the Monterey Bay Aquarium Research Institute (MBARI).

Chief Scientists:

- **Earle, Sylvia**
- **Cava, Francesca**

Principal Investigators:

- **Yoklavich, Mary.** Fish assessment in the no-take area, Big Creek Ecological Reserve
- **Starr, Rick.** Prickly shark ecology
- **Robison, Bruce.** Day/night activity patterns of mid-water fish and invertebrates
- **Guardino, Mike.** Teacher in the Sea and education related to marine reserves
- **Harrold, Chris.** Pilot study on sediment flow near the Moss Landing dredge disposal site
- **Earle, Sylvia**. Exploration in the Monterey Bay National Marine Sanctuary

Additional Pilots:

- **Webster, Steve**. Co-pilot on Education projects.
- **Reisenbichler, Kim.** Co-pilot on MBARI team (Day/night patterns in mid-water)
- **Douros, William.** Mission Coordinator; co-pilot on Big Creek Team.

1.0 ORGANIZATIONAL STRUCTURE

1.1 STRUCTURE

- *Commanding Officer* - Final approval authority for all operations. Both the Commanding Officer and Dive Supervisor must agree that conditions are acceptable for the submersible to be launched.

- *Dive Supervisor* - Responsible for the procedures and coordination of all dive operations. Both the Commanding Officer and Dive Supervisor must agree that conditions are acceptable for the submersible to be launched.

- *Chief Scientist* - Responsible for collaborating with the CO, Dive Supervisor, and Mission Coordinator to implement the Cruise Plan and to develop the "Plan of the Day" (POD). The Chief Scientist has decision-making authority for any departures from the schedule, planned activities, or personnel.

- *Mission Coordinator* – Responsible for collaborating with the CO, Dive Supervisor, and Chief Scientist to implement the Cruise Plan and to develop the POD. The Mission Coordinator is also responsible for organizing and overseeing the processing, storage, and transmittal of data and information collected during submersible dive operations.

- *Principal Investigator* - Responsible for the individual project content.

- *Pilot* - Certified DeepWorker pilot approved for the specific mission dive.

- *Mission Log Coordinator* – Responsible for compiling the Mission Log for the NGS SSE

Web site.

1.2 PROTOCOL

Dive Authority – The Commanding Officer and the Dive Supervisor will make the final decision on dive operations.

Project implementation – The CO, Dive Supervisor, Chief Scientist, Mission Coordinator,
and other required personnel will develop the POD based on the Cruise Plan. Both the Commanding Officer and Dive Supervisor must agree that conditions are acceptable for the submersible to be launched, while the Chief Scientist has decision-making authority for any departures from the schedule, planned activities, or personnel.

2.0 OVERVIEW OF OPERATIONS

From May 8 through 22 of 1999 the MBNMS SSE cruise will be a coordinated effort consisting of seven studies with participants from the Monterey Bay National Marine Sanctuary, Moss Landing Marine Labs., California Sea Grant, Monterey Bay Aquarium, Carmel High School, SSE, Monterey Bay Aquarium Research Institution, California Department of Fish and Game, and the National Marine Fisheries Service. Moreover, University of California scientists will study krill during the 12 hours per day that the *Deep Worker* is not available for work. The general areas of operations include the Big Creek Ecological Reserve and the heads of the submarine canyons in the Monterey Bay.

3.0 ITINERARY

Due to the weather demands along the Big Sur coast (Big Creek Project) and variable water clarity at the head of Monterey Canyon (Prickly Sharks Project), all MBNMS pilots have agreed to keep flexible during the second week of the MBNMS mission. This has been decided for safety reasons and for science. If the weather is favorable, we will implement the schedule below. If the conditions along Big Sur are prohibitive for May 15 - 17, we will shuffle projects in the second week to adjust for weather. However, two projects have fixed dates: Sylvia Earle's dates are fixed on May 13 and 14; the Teacher in the Sea dates cannot fall on May 17 due to the student summit in Monterey on that day.

MAY

07 Alongside Day in San Francisco, Pier 1

All day — To be used to retrofit submersible, etc.
MBNMS pilots or researchers with heavy gear, load on this day.

08 Open House at Pier 1 in San Francisco

1200 - 1600 — Open house in San Francisco with GFNMS/CBNMS staff.

1600 - 2000 — *McArthur* available to load personal, light gear in San Francisco.

2000 — *McArthur* sails for Monterey; anchors off harbor by 0600; if weather is definitely bad, we will find quiet water off Santa Cruz after shuttling SSE from Monterey in a.m..
The goal is to conduct training off Hopkins Refuge, in Monterey.

09 Pilot Training

0600 — Load pilots or SSE crew not already on *McArthur*, via *SharkCat*, at Coast Guard pier in Monterey.
Pilots for Day 1: Robison, Reisenbichler, and Harrold (Yoklavich)

0615 — *McArthur* transits to training site (training site likely to be Hopkins Marine Life Refuge), final decision depends on quiet water. Depth of sites: 80 ft -- 200 ft.

0645 Arrive at site; begin prepping *DeepWorker* and skiff; briefing by Douros/SSE re: training goals of the day
0730 Start dive operations
Purpose: Test launch/recovery; test subs; train as many pilots as possible
1900 Complete operations, return to anchor off harbor
1930 *SharkCat* shuttles scientists back to harbor, **if needed.**

10 Pilot Training
0600 Load pilots on *McArthur*, via *SharkCat*, at Coast Guard pier in Monterey, **if needed**.
0615 *McArthur* transits to training site, final decision depends on quiet water.
0645 Arrive at site; begin prepping *DeepWorker* and skiff; briefing by Douros/SSE re: training goals of the day
0730 First pilot begins pre-dive checkout
0900 First pilot begins dive.
Purpose: Test launch/recovery; test subs; train as many pilots as possible
Pilots for Day 2: Yoklavich, Starr and Douros; *time permitting*, Webster, Evans SSE photos if prior training is ahead of schedule and weather permits
1900 Complete operations, return to anchor off Monterey Harbor
1930 *SharkCa*t shuttles scientists back to harbor
2000 ROV Ops at head of Monterey Canyon, Moss Landing, for Prickly Sharks
If weather not good, squid searches off Pacific Grove
2400 Wrap-wup ROV operations

11 MBARI Day 1
NO MORNING SHUTTLE AT HARBOR
0500 *McArthur* arrives off Point Pinos; begin prep for dives
0630 Begin dives -- Nuytco checkout to 350 ft., then MBARI dives ~~1500~~
1700 Complete operations; return to harbor; anchor
Shark Cat shuttles from *McArthur*

12 MBARI Day 2/Media Day, Open House -- JOINT OPERATIONS WITH MBARI ROV
NO MORNING SHUTTLE AT HARBOR
0500 *McArthur* positions for MBARI dives at Point Pinos. Begin prepping submersible.
0630 Commence dive operations
0800 *SharkCat*/USCG loads media at Monterey Harbor, transits to *McArthur*
0830 Arrive at *McArthur* with media; observes recovery of *DeepWorker* from USCG vessel
0900 Load media onto *McArthur*
1200 Transfer media back to USCG, return to harbor aboard
~~0600: Robison dive1200150013~~00 Complete operations, depart for Monterey Harbor
1600 - 1800 Local VIPs/Open House shuttled onto *McArthur* via *SharkCat*/USCG. MBNMS to provide refreshments.
2200 *McArthur* transits to Carmel Bay

13 SSE/Sylvia Earle -- JOINT OPERATIONS WITH MBARI ROV
NO MORNING SHUTTLE AT HARBOR
0600 At Carmel Bay, goal of day will be diving with two submersibles for Bruce Robison, Sylvia Earle and joint operations with MBARI ROV. See Dive section for details.
0800 *Pt. Lobos*, w/Ventana ROV arrives at Carmel Bay dive site.
0800 First *DeepWorker* launched.
1500 Wrap up operations, return to Monterey Harbor area, or stay at site.

14 SSE Day 2 -- **JOINT OPERATIONS WITH MBARI ROV**
SPECIAL EVENT -- NASA WEB CHAT (2), ADDITIONAL MEDIA DAY (?), IF NEEDED
If May 13th operations not successful, repeat on the 14th. Otherwise, day dedicated to Sylvia Earle; Francesca Cava will dive this day. A full itinerary still needs to be formalized. We also

would like to conduct a photo dives for Kip Evans on this day, time permitting. This day will also be used as a backup media day if interest is high. Francesca to do NASA web chat.

1700	Arrive at Monterey Harbor and unload Sylvia, MBARI scientists
1700-1830	Reception at Nelson Gallery for SSE, McArthur officers.
1930	Load Big Creek team, SSE, officers all via *SharkCat*.
2000	*McArthur* departs for Big Creek

Acoustic doppler current profiles and thermosalinographs will be recorded during the run to Big Creek along the following track lines:

WAYPOINT	LAT./LONG.	COMMENTS
1	36 39'N / 121 57'W	Pt. Pinos
2	36 18'N / 122 20'W	
3	36 18'N / 121 56'W	Pt. Sur
4	35 58'N / 122 12'W	
5	36 04'N / 121 37'W	Big Creek

15 Big Creek

NO MORNING SHUTTLE AT HARBOR

0600	Prep work begins on *DeepWorker* and launch
0700	Begin dives
1830	Wrap-up submersible operations
1900	Run ROV ops, or ADCP tracks not completed on trip from Monterey Harbor

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NO MORNING SHUTTLE AT HARBOR

0600	Prep work begins on *DeepWorker*, launch
0700	Begin dives
1830	Wrap-up operations
1900	Run ROV ops, or ADCP tracks

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NO MORNING SHUTTLE AT HARBOR

0600	Prep work begins on *DeepWorker*, launch
0700	Begin dives
1830	Wrap-up operations; collect ADCP data during transit to Monterey Harbor

18 Teacher/Education

SPECIAL EVENTS -- NASA LIVE VIDEO (2), 6 HIGH SCHOOL STUDENTS; MEDIA REPORTER/PHOTO(2)

0600	Monterey Harbor; unload scientists, load Guardino, Webster, and high school students/teacher (6 people) observers, NASA Web Team,; transit to Carmel Bay MBNMS *SharkCat* to serve as shuttle
0700	Arrive at and anchor off Point Lobos; prep. *DeepWorker*
0800	Begin dives -- Initial dives will be checkout dives for Guardino, Webster
1800	Complete operations, return to Monterey; *SharkCat* offloads observers, NASA, Starr Loads Marinovic, Clark onto *McArthur*
2000	Start krill work, if weather, time permit. Net tows.

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SPECIAL EVENTS -- 6 HIGH SCHOOL STUDENTS, POSSIBLY ADDITIONAL MEDIA MID-MORNING

0600	Arrive at Monterey Harbor, *SharkCat* shuttles high school student observers (6)
0700	Arrive at and anchor off Point Lobos; prep. *DeepWorker* and launch
0800	At Monterey Harbor, *SharkCat* loads media if interested, transits to Carmel Bay
0830	Begin dives
0900	Media interest may be high for Teacher, so plan *SharkCat* delivery in a.m.
1900	Complete operations; transit to Monterey

2000 Unload Webster, Guardino, observers via *SharkCat*; load Prickly Shark Team
2030 Continue krill work

20 Prickly Sharks

NO MORNING SHUTTLE AT HARBOR
0600 Arrive at head of Monterey Canyon and begin prepping the *DeepWorker* and launch~~We~~
0730 Begin dives
1830 Retrieve sub and end operations
2000 Continue krill work

21 **NO MORNING SHUTTLE** AT HARBOR
0600 Arrive at Monterey Canyon off Moss Landing Harbor
0730 Begin dives at Monterey Canyon
1830 Retrieve sub and end operations
1930 Offload Prickly Shark team, Krill team at Monterey Harbor
2100 Depart for Santa Barbara

22 Contingency Day Used for DeepWorker 2000 Transfer

4.0 PROJECT DESCRIPTIONS

Project descriptions can only be considered a guide as to how the Chief Scientist and Principal Investigators expect the projects to progress without being able to predict the weather, operational and scheduling problems, and equipment failures.

4.1 PROJECT DIVES

The weather at all the dive sites, especially Big Creek, is often best early in the morning and early in the evening, so we may modify the schedule to focus dives in these time periods. Times below are based on optimum conditions.

May

9 Pilot Training
0645 Arrive at training site; begin prepping *DeepWorker* and skiff; briefing by Douros/SSE re: goals of the day
0730 First pilot (Robison) begins pre-dive checkout
0900 First pilot begins dive.
Purpose: Test launch/recovery; test subs; train as many pilots as possible
Details of dive: 80 ft. -- 150 ft. profile
app. 1 hour duration
1100 Second pilot (Reisenbichler) begins prep. for dive.
Purpose: Test launch/recovery; test subs; train as many pilots as possible
Details of dive: 80 ft. -- 150 ft. profile
app. 1 hour duration
1430 Third pilot (Harrold) begins prep. for dive.
Purpose: Test launch/recovery; test subs; train as many pilots as possible
Details of dive: 80 ft. -- 150 ft. profile
app. 1 hour duration
time permitting If we complete checkout dives quickly, we will continue in order, w/Yaklovich
1900 Complete operations, return to anchor off Monterey Harbor

10 Pilot Training
0645 Arrive at site; begin prepping *DeepWorker* and skiff; briefing by Mission Coordinator/SSE re: training goals of the day
0730 Prep works begins on *DeepWorker*, launch
0900 First pilot (Yoklavich) begins dive

Purpose: Test launch/recovery; test subs
Details of dive: 80 ft. -- 150 ft. profile
app. 1 hour duration

1100 Second pilot (Starr) begins prep. for dive
Purpose: Test launch/recovery; test subs
Details of dive: 80 ft. -- 150 ft. profile
app. 1 hour duration

1430 Third pilot (Douros) begins prep. for dive
Purpose: Test launch/recovery; test subs
Details of dive: 80 ft. -- 150 ft. profile
app. 1 hour duration

time permitting Steve Webster conducts checkout dive

time permitting Kip Evans, *time permitting*.
Purpose: SSE Photo dive
Details of dive: 80 ft. -- 200 ft. profile
app. 1.5 hours duration

1900 Complete operations, return to Monterey harbor

2000 If weather is acceptable, ROV ops. -- Moss Landing area to look for Prickly Sharks

11 MBARI Day 1/(Nuytco checkout)

NO MORNING SHUTTLE AT HARBOR

0500 ___Arrive at Point Pinos; prep for first dive, Nuytco checkout

0630 Nuytco dive
Depth: 350 ft.
Duration: 30 minutes
Purpose: Test DeepWorker 350 at depth

0900 Robison dive~~1700-2200: Krill work~~

~~2300: To Soquel Canyon~~

~~2400: Yoklavich dive~~
Location: Point Pinos
Depth: 300 ft. -- on bottom
Duration: 2.5 hours
Purpose: video distribution, abundance and behavior of invertebrates/fish

1330 Reisenbichler dive
Location: Point Pinos
Depth: 150 ft. -- mid-water
Duration: 2.5 hours
Purpose: video distribution, abundance and behavior of invertebrates/fish

1700 Complete operations, transit to Monterey Harbor

12 MBARI Day 2/Media Day, Open House -- JOINT OPERATIONS WITH MBARI ROV

NO MORNING SHUTTLE AT HARBOR

0500 *McArthur* positions for MBARI dives at Point Pinos. Begin prepping submersible.

0630 Launch first dive, Robison pilot~~1700-2200: Krill work~~

~~2300: To Soquel Canyon~~

~~2400: Yoklavich dive~~
Location: Point Pinos
Depth: 300 ft.
Duration: 2.0 hours
Purpose: video distribution, abundance and behavior of fish/invertebrates

0800 *SharkCat*/USCG loads media at Monterey Harbor, transits to *McArthur*

0830 Media arrives at *McArthur*, shoots recovery from SharkCat/USCG

0900 Load media onto *McArthur*; begin prep. for second dive

1030 Launch second dive, Reisenbichler pilot
Location: 36.6764 W, 122.0277 N
Depth: 150 ft
Duration: 2.0 hours
Purpose: video distribution, abundance and behavior of fish/invertebrates

1130 Park DeepWorker on bottom; transfer media from *McArthur* for transit to shore

~~0600: Robison dive120015001~~300 Recover submersible; complete operations, depart for Monterey Harbor

1600 - 1800 Local VIPs/Open House shuttled onto *McArthur* via *SharkCat*/USCG.

2200 *McArthur* transits to Carmel Bay

13 SSE/Sylvia Earle-- JOINT OPERATIONS WITH MBARI ROV

NO MORNING SHUTTLE AT HARBOR

0600 At Carmel Bay, begin prepping two submersibles for Bruce Robison and Sylvia Earle. Goal of day will be joint operations with MBARI ROV.

0800 *Pt. Lobos*, w/Ventana ROV arrives at Carmel Bay dive site.

0800 First *DeepWorker* launched, Earle pilot
Location: Carmel Bay -- coordinates to be determined
Depth: 300 ft.
Duration: 5.5 hours
Purpose: observation, video work, joint operations

0830 Second *DeepWorker* launched, Robison pilot
Location: Carmel Bay -- coordinates to be determined
Depth: 300 ft.
Duration: 4.5 hours
Purpose: observation, video work, joint operations

0845 *McArthur* pulls away, app. 1 kilometer; subs wait on bottom.

0900 Ventana ROV launched; joint mission commenced.

1230 Pull Ventana ROV from water; *Pt. Lobos* leaves dive site.

1300 *McArthur* returns to dive site, recovers *DeepWorkers*, Robison, from water

1330 *DeepWorker*, Earle pilot, recovered

1500 Wrap up operations, return to Monterey Harbor area, or stay at site.

14 This day will be dedicated to Dr. Earle a full itinerary still needs to be formalized. If dives planned for May 13th with MBARI ROV are scrubbed due to weather or for technical reasons, they will be repeated on 14th. Francesca Cava will dive this day. We would like to also use this day for photo dive by Kip Evans.

2000 *McArthur* departs for Big Creek, with Big Creek Team.
Acoustic doppler current profiles and thermosalinographs will be recorded during the run to Big Creek.

15 Big Creek

NO MORNING SHUTTLE AT HARBOR

0600 Prep works begins on *DeepWorker* and launch

0730 Yoklavich dive
Location: Big Creek Reserve
Depths: 150 ft.
Duration: 2.5 hours
Purpose: transects, video, distribution, abundance and behavior of fish

1200 Starr dive
Location: Big Creek Reserve
Depths: 150 ft.
Duration: 2.5 hours

Purpose: transects, video, distribution, abundance and behavior of fish

1630 Yoklavich - *time permitting*
Location: Big Creek Reserve
Depths: 150 - 200 ft.
Duration: 1.0 hour
Purpose: transects, video, distribution, abundance and behavior of fish

1930 Wrap-up submersible operations

16 **NO MORNING SHUTTLE** AT HARBOR

0600 Prep works begins on *DeepWorker*, launch

0730 Douros dive
Location: Big Creek Reserve
Depths: 150 ft.
Duration: 2.5 hours
Purpose: transects, video, distribution, abundance and behavior of fish

1200 Yoklavich dive
Location: Big Creek Reserve
Depths: 150 -- 200 ft.
Duration: 2.5 hours
Purpose: transects, video, distribution, abundance and behavior of fish

1630 Starr dive - *time permitting*
Location: Big Creek Reserve
Depths: 150 -- 200 ft.
Duration: 1.0 hour
Purpose: transects, video, distribution, abundance and behavior of fish

1930 Wrap-up submersible operations

17 **NO MORNING SHUTTLE** AT HARBOR

0600 Prep works begins on *DeepWorker*, launch

0730 Yoklavich dive
Location: Big Creek Reserve
Depths: 150 -- 300 ft.
Duration: 2.5 hours
Purpose: transects, video, distribution, abundance and behavior of fish

1200 Douros dive
Location: Big Creek Reserve
Depths: 150 -- 200 ft.
Duration: 2.5 hours
Purpose: transects, video, distribution, abundance and behavior of fish

1630 Starr dive - *time permitting*
Location: Big Creek Reserve
Depths: 150 -- 300 ft.
Duration: 1.0 hour
Purpose: transects, video, distribution, abundance and behavior of fish

1930 Wrap-up submersible operations; transit to Monterey Harbor

18 **Teacher/Education**

0600 Monterey Harbor; unload Big Creek Team, load Guardino, Webster; krill team transit to Carmel Bay.
MBNMS *SharkCat* to serve as shuttle

0700 Arrive at and anchor off Point Lobos; prep. *DeepWorker*

0830 Guardino dive -- FIRST PART OF DIVE WILL BE FOR CHECKOUT/TRAINING
Location: Blue Fish Cove, Pt. Lobos Reserve
Depths: 150 ft.
Duration: 2.5 hours
Purpose: Video transects looking for fish, invertebrates, and habitat

1300 Webster dive -- FIRST PART OF DIVE WILL BE FOR CHECKOUT/TRAINING
Location: Blue Fish Cove, Pt. Lobos Reserve
Depths: 150 ft.
Duration: 2.5 hours
Purpose: Video transects looking for fish, invertebrates, and habitat
1730 Guardino dive - *time permitting*
Location: Blue Fish Cove, Pt. Lobos Reserve
Depths: 150 -- 200 ft.
Duration: 1.0 hour
Purpose: Video transects looking for fish, invertebrates, and habitat
1900 Complete operations; transit to Monterey Harbor
2000 Offload High School observers, NASA crew
2100 Commence krill work; net tows

19 SHARKCAT MAY BRING MEDIA IN A.M.
0700 Arrive at and anchor off Point Lobos; prep. *DeepWorker* and launch
0830 Webster ~~Webster~~ dive
Location: Blue Fish Cove, Pt. Lobos Reserve
Depths: 150 -- 200 ft.
Duration: 2.5 hours
Purpose: Video transects looking for fish, invertebrates, and habitat
1300 Guardino dive
Location: Blue Fish Cove, Pt. Lobos Reserve
Depths: 150 -- 200 ft.
Duration: 2.5 hours
Purpose: Video transects looking for fish, invertebrates, and habitat
~~1300~~1730 Webster dive - *time permitting*
Location: Blue Fish Cove, Pt. Lobos Reserve
Depths: 100 -- 300 ft.
Duration: 1.0 hour
Purpose: Video transects looking for fish, invertebrates, and habitat
1900 Complete operations; transit to Monterey Harbor
2000 Unload Education team, observers; load Prickly Shark team
2030 Continue krill work

20 Prickly Sharks
NO MORNING SHUTTLE AT HARBOR
0600 Arrive at head of Monterey Canyon, off Moss Landing, begin prepping the *DeepWorker*
0730 Starr dive
Depth: 120 -- 300 ft.
Duration: 2.5 hours
Purpose: Track sonically tagged prickly sharks, observe behavior
1200 ~~Webster~~ Harrold dive
Depth: 80 -- 150 ft.
Duration: 2.5 hours
Purpose: Track and observe sharks; observe pattern of dispersion of dredge spoils at mouth of Canyon
1630 Starr dive - *time permitting*
Depth: 120 - 400 ft.
Duration: 1.0 hour
Purpose: Track and observe sonically tagged sharks
1800 Complete operations; transit to krill sites
2000 Continue krill work

21 **NO MORNING SHUTTLE** AT HARBOR
0600 Arrive at head of Monterey Canyon, off Moss Landing, begin prepping the *DeepWorker*

0730	Starr dive	
	Depth:	120 -- 500 ft.
	Duration:	2.5 hours
	Purpose:	Track sonically tagged prickly sharks, observe behavior
1200	~~Webster~~ Harrold dive	
	Depth:	80 -- 200 ft.
	Duration:	2.5 hours
	Purpose:	Track and observe sharks; observe pattern of dispersion of dredge spoils at mouth of Canyon
1630	Starr dive - *time permitting*	
	Depth:	120 - 500 ft.
	Duration:	1.0 hour
	Purpose:	Track and observe sonically tagged sharks
1830	Complete operations, transit to Monterey Harbor	
1930	Offload Prickly Shark team, Krill team and gear at Monterey Harbor	
2100	Depart for CINMS	

2 2 Contingency Day Used for DeepWorker 2000 Transfer

4.2 SCUBA OPERATIONS - Kip Evans, photographer for National Geographic Society, has asked that the *McArthur* be alerted that he may want to scuba dive on all days to shoot photos and video to document the mission. Weather will be critical factor for deciding dive ops. A separate support boat will be used for diving, probably the *SharkCat* or RHI. Likely dive days are during Sylvia Earle days, and Teacher in the Sea days; unlikely dive days would be during Big Creek, due to difficulty obtaining separate boat for dive operations.

4.3 OTHER PROJECTS - These are projects related to the cruise, but do not involve dive operations.

Event Name: Student Summit
Purpose: Discus marine conservation issues, with a focus on no-take areas.
Primary Participants: William Douros, Sylvia Earle, Steve Webster , Liz Love, Mary Yoklavich, Mike Guardino, and teachers and students
Date, Time, and Location: May 17, 12:00 - 4:430 PM at the Maritime Museum Auditorium
Alternative Date and Time: None
Specific Request from Ship: N/A

Event Name: Krill study
Purpose: Assess distribution and abundance of krill related to marine mammal distributions.
Primary Participants: Baldo Marinovic and Kit Clark.
Date and Time: 5/18 - 5/22, time permitting
Alternative Date and Time: N/A
Specific Request from Ship: Ability to tow bongo nets

Event Name: Teacher and students at sea
Purpose: To share first-hand exploration and research with the students.
Primary Participants: Guardino and Carmel High students
Date and Time: During Guardino's dives (5/18, 5/19)
Alternative Date and Time: N/A
Specific Request from Ship: N/A

Event Name: Media Day, Open House Aboard McArthur
Purpose: To share exploration and research with the public.
Primary Participants: Reisenbichler, Robison, Douros, other available pilots

Date and Time: 5/12
Alternative Date and Time: Additional media interest for Teacher will be on 5/19
Specific Request from Ship: Possibly shuttles; prep./warm food provided by MBNMS

Event Name: Student projects
Purpose: Deploy student project at sea.
Primary Participants: Steve Webster and students to be selected
Date and Time: In concert with Mike Guardino and Steve Webster dives
Alternative Date and Time: N/A
Specific Request from Ship: N/A

Event Name: ROV Operations
Purpose: Search for Prickly Sharks, squid, Rockfish, and video of mooring buoys
Primary Participants: Rick Starr, Bill Douros, Mary Yoklavich, Kim Reisenbichler
Date and Time: Prickly sharks, evening of May 10;
Squid May 10 if weather a problem for Prickly Sharks
Rockfish, May 15, 16 at Big Creek
Mooring buoys, squid, when weather prohibits submersible ops.
Alternate date and time: N/A
Specific Request from Ship: Relocate to ROV sites

5.0 OPERATIONAL PLANS

The following operational plans can only be considered a guide as to how the Chief Scientist expects the project to progress without being able to predict the weather, operational and scheduling problems, and equipment failures.

5.1 SSE PROJECTS

Seasonal comparisons of deep water habitats and fishes in Big Creek Marine Ecological Reserve
Principle Investigators: Mary Yoklavich and Bob Lea

With funding from the state of California and UC grant Program, a multi-disciplinary research program is being carried out at the Big Creek Ecological Reserve (BCER) off central California. BCER has been designated a "no-take" marine protected area since 1994. We have produced high-resolution maps of benthic habitats, and are using them in conjunction with extensive surveys of fishes conducted from a manned submersible, to produce a detailed baseline ecological characterization of the deep areas (30-300m) within and adjacent to BCER. This information provides the basis for future documentation of the changes occurring in this newly established research reserve, and will help in evaluating the use of "no-take" marine protected areas as a supplement to fisheries management.

Sustainability and use of habitats may change seasonally for different species of fishes, particularly considering reproductive condition. Seasonal habitat use may also be related to changes in oceanographic conditions associated with local upwelling, storms, runoff etc. Our research in BCER has been conducted in September and October. As part of the SSE, we propose to use DeepWorker to survey benthic fish resources at the onset of upwelling season (April). We will quantify relative abundance, species composition, and size structure of fishes relative to depth and habitat type in deepwater off BCER and adjacent unprotected areas, and compare these variable between the two different times of year (Fall and Spring).

Prickly Shark Ecology
Principle Investigators: Richard M. Starr and Gregor M. Cailliet

Previous scuba surveys (Crane and Heine 1992) have shown that prickly sharks (*Echinorhinus cookei*) and other deep water sharks aggregate at the heads of submarine canyons. Due to the absence of a directed fishery and the limitations of scuba surveys (i.e. time and depth limits), little is known about even basic aspects of prickly shark biology. We propose in Phase I of SSE to use the DeepWorker to conduct visual transects at the heads of several of the major canyons in the MBNMS to estimate the distribution and relative abundance of prickly and other large sharks.

Day-night patterns in activities of deep-water rockfishes in natural and designated harvest refugia

Principle Investigators: Mary Yoklavich and Peter Auster (a potential exploration project for Earle)

This project has been cut from the formal MBNMS mission. However, we have left it here should Dr. Sylvia Earle wish to do parts of this project with her two days.

Large concentrations of marine fishes have been associated with banks, seamounts, pinnacles, and other isolated rocky features in deep water. Over the past five years, an interdisciplinary team of marine fishery biologists, geologists, and ecologists from federal and stated resource management agencies and academic institutes has been pioneering research on bottom-dwelling fishes associated with deepwater shelf and canyon habitats within the Monterey Bay National Marine Sanctuary (MBNMS). We have combined the use of side-scan sonar, bathymetry, and manned submersible operations to effectively identify and characterize large-(i.e., 100's of meters to kilometers) and small-scale (i.e., 1 meter to 10's of meters) habitats that support adult fishes in deep water (i.e. 50-300m depth), and have produced high resolution maps of benthic habitats in several areas within the MBNMS, including the heads of five submarine canyons. From the results of our under water research, we have described functional guilds or assemblages of benthic fishes based on their associations with specific seafloor habitats, including various combinations of rock features and textures. We have found diversity, quality, and extent of bottom types to be among the most significant environmental determinants of distribution, abundance, and species richness of benthic fishes. However, information on how fish species use these deepwater habitats is lacking in general; particularly weak is our understanding of how species interactions, small-scale and day-night activity comparisons of species inhabiting inaccessible areas such as rugged complex rock outcrops of high relief.

Rockfishes (*Sebastes* spp.) are one of the most numerous, diverse, and economically important groups of fishes on rocky outcrops along the west coast from Alaska to California. Many species of rockfishes are slow-growing, long-lived, mature at older ages, and have extremely variable recruitment, which leaves them particularly vulnerable to overexploitation. Indeed, significant declines in abundance and size of economically valuable species now are being noted. Like other coastal fisheries, as local stocks become depleted in shallow water and more effective gear is developed, fishing effort for rockfishes has expanded into deeper and more remote areas. Timing is ever-more critical to gather information on rockfish populations and the function and value of their habitats in deep coastal water.

The DeepWorker provides a unique opportunity to quantitatively evaluate day-night activities and habitat-use by rockfishes on deep rock outcrops in MBNMS. It is suspected that deepwater benthic rockfishes exhibit little or no large-scale movement but direct assessments of small-scale activities have not been made before now. Initially we will conduct strip transects to measure species and size composition on selected rock outcrops along the walls of Sequel Submarine Canyon. Subsequently, the submersible will be used as a "fish blind" to make direct observations of individual habitat-specific activity patterns for targeted species during the day and night (from noon to midnight). All data will be recorded on video tape.

These data will be compared with similar information collected in the Big Creek Ecological Reserve (BCER), which is a newly designated no-take marine protected area. A complimentary SSE proposal is being submitted by Yoklavich, Cailliet and Lea to survey fishes and habitats in BCER in daytime during spring upwelling season. We propose to enhance that study with day-night observation of rockfish activity and movements within the reserve.

Diurnal migrations of mesopelagic organisms associated with the edge of submarine canyons.
Principle Investigators: George Matsumoto and Bruce Robison

This project proposes to examine a vast area of the oceans that has been sporadically sampled in the past- the top 300 meters of the water column. The expertise of the research team includes vertebrates and invertebrates and our goals include: an examination of the fishes in the sonic scattering layer and a comparison of this survey to previous studies in the 1950's (Barham) and in the 1970's (Robison); and an investigation into the smaller invertebrate fauna with a focus on the gelatinous zooplankton. Robison used Deep Rover in the 1970's and MBARI has been surveying Monterey Bay over the past 10 years. A large amount of data has been gathered (and published) on some of the fauna of Monterey Bay. The SSE project would include surveys by the Deep Worker submersible and the remotely operated vehicle (ROV) Ventana. This exploration of the midwater that would include day/night comparisons (vital towards our understanding of the migratory habits of these organisms) and a comparison of different research techniques. Net trawls provide some information but have been considered inadequate in sampling the fast, the small, and those with auditory capability. Remote vehicles and manned submersibles are good platforms for both the fish and the smaller fauna and we will endeavor to sample the same water mass with all three research techniques.

Teacher in the Sea and education related to marine reserves.
Principle Investigators: Steve Webster and Mike Guardino

One grade 9 -12 teacher from the Monterey Bay region is being trained to pilot the DeepWorker submersible this year. A competitive application process was held and Mike Guardino, a teacher at Carmel High School was selected for this position. He will make up to three DeepWorker dives during a period of one to two days in the Carmel canyon during the two-week May expeditions. One of his main roles is to conduct student research projects. Dr. Steve Webster from the Monterey Bay Aquarium will assist Mike in conducting the student research projects. Mike is also giving many public presentations on SSE to schools and the regional community. In addition, he is

developing SSE curriculum activities for 9-12 teachers. High school students and teachers, for a total of 8 people, will be making day trips to the McArthur to observe this project.

Pilot study on sediment flow near the Moss Landing dredge disposal site.
Principle Investigator: Chris Harrold

In future years of the Sustainable Seas Expeditions, the MBNMS would like to document impacts of sewer outfalls and dredge disposal. Preliminary surveys of sediment flow and impacts to the benthos will be made at the Moss Landing Harbor District dredge disposal site.

Exploration in the Monterey Bay National Marine Sanctuary.
Principle Investigator: Sylvia Earle

The specific study has yet to be determined, but may include surveys of fish in canyons that provide natural harvest refuge from fishing or documenting the wonders of gelatinous midwater species.

5.2 ADDITIONAL PROJECTS

Activities for 9-12 teachers and students

Both students and teachers possess the ability, given the right resources and opportunities, to teach others about the ocean and the need to explore and conserve it. The SSE and the access it provides to the DeepWorker submersible will be used to inspire interest and learning in science, natural history, conservation, technology, communication and related careers to grade 9 - 12 students and teachers in central California counties.

The MBNMS proposes the following SSE activities for 9-12 students in 1999, and possibly for the remaining years of the expeditions. (Evaluation will be critical this year.) The purpose is to involve high school students in developing personal and public understanding and stewardship of the National Marine Sanctuaries and their conservation issues through participation in Sustainable Seas Expeditions research and education projects.

Teacher & Students at Sea

Teacher(s) and a few high school students (total of 8 people per day) may be invited to spend a day on the McArthur to experience and document the expeditions first-hand. This will happen on May 18 and 19 during the Teacher/Education project days (and will be shifted to track the Teacher/Education days).

Student Projects

One grade 9-12 student team science project will be deployed by the DeepWorker in the MBNMS and conducted by the teacher pilot and Dr. Steve Webster. This year, the student project will look at the effectiveness of a no-take marine reserve, focusing on the Pt Lobos Reserve and deep-water rockfish and spot prawns.

Other 9-12 student team projects (not necessarily science-oriented) will also be encouraged around the topic of no-take marine reserves. The preparation, progress and results of the student projects (information, reports, images and data) can be shared via the Internet and at a student summit (see below.). Hopefully, a student maintained WebPage will showcase student projects and ideas, and provide the main vehicle for communication among the students involved in SSE nationwide.

Student Summit

A student summit will be held on May 17, 1999 from 1:00 - 5:00 PM at the Stanton Center in Monterey to discuss student projects and conservation issues related to the health and protection of our oceans. The summit will specifically focus on the topic of no-take marine reserves. The summit will include a panel with Dr. Sylvia Earle, Dr. Steve Webster, Craig Dahlgren, Teacher pilot Mike Guardino and some of his students. Dr. Sylvia Earle will introduce SSE and general conservation issues related to the health and protection of our oceans. Steve will introduce and share general information about no-take marine reserves. Mike Guardino and the students will discuss the Point Lobos Reserve student research project. Following the panel student teams (4-5 students from 10-12 high schools from the Central Coast region) will share their SSE projects with one another.

Media Activities

During the expeditions, the media will be invited here to share the experience and primary messages of the SSE, along with newly obtained images. Dr. Earle and some of the research scientists involved with the MBNMS expeditions, as well as the teacher pilot (Mike) and some of the other teachers and students involved in SSE might all participate in the media activities. A separate day (May 12) is proposed to shuttle interested media to the ship and allow them to spend a day with the operations. No more than 12 media will be on board during this time. It is also likely there will be media interest when Sylvia makes her dives, and during the teacher/education days. MBNMS would shuttle press out to the *McArthur* during this time -- May 14 for Sylvia, and May 19 for teacher. The media may also be invited to the student summit.

***McArthur* & *DeepWorker* Open House**
as of May 7, 1999

The public and selected VIPs will be invited to tour the *McArthur*, view the DeepWorker submersible and other displays (posters on SSE research projects, NMS and SSE exhibits, etc.), and meet with NMS and SSE staff, scientists, students and teachers to learn about SSE goals and activities. Date has be changed slightly to be in the evening on May 12, from 4:00 p.m. to app. 6:00 p.m.

6.0 CONTACT PERSONNEL

Scientific Operations:

Andrew De Vogelaere
Monterey Bay National Marine Sanctuary
299 Foam Street
Monterey, CA 93940
Office - 831-647-4201 Fax - 831-647-4250

Ship Operations:

NOAA Pacific Marine Center
LT Dana Wilkes
1801 Fairview Ave, E.
Seattle, WA, 98102
Office - 206-553-4548 Fax - 206-553-1109

7.0 SCIENTIFIC PERSONNEL

7.1 The Chief Scientist is authorized to alter the scientific portion of this cruise plan with the concurrence of the Commanding Officer, provided that the proposed changes will not: (1) jeopardize the safety of personnel or the ship (2) exceed the time allotted for the cruise (3) result in undue additional expense or (4) change the general intent of the project.

7.2 PARTICIPATING SCIENTISTS

NAME	GENDER/NATIONALITY	PROJECT	ORGANIZATION
Cailliet, Greg	M/USA	Sharks	MLML
Cava, Francesca	F/USA	Chief Scientist	SSE
Clark, Kit	F/USA	Krill	UCSC
Douros, William	M/USA	Mission Coord.	MBNMS
DeVogelaere, Andrew	M/USA	Mission Planning	MBNMS
Earle, Sylvia	F/USA	Chief Scientist	SSE
Harrold, Chris	M/USA	Dredge	MBA
Harvey, James	M/USA	BCER	MLML
Lea, Bob	M/USA	Big Creek	CDFG
Maher, Norm	M/USA	Sharks	MBARI
Marinovic, Baldo	M/USA	Krill	UCSC
Reisenbichler, Kim	M/USA	Day/Night	MBARI
Robison, Bruce	M/USA	Day/Night	MBARI
Starr, Rick	M/USA	Sharks	Sea Grant
Webster, Steve	M/USA	Teacher in Sea	MBA
Yoklavich, Mary	F/USA	BCER	NMFS

7.3 PARTICIPATING TECHNICIANS

deMarignac, Jean	M/USA	BCER	MLML
deMarignac, Lisa	F/USA	BCER	MBNMS

7.4 OTHER PERSONNEL

Evans, Kip	M/USA	Photos	SSE
Giffen, Jason	M/USA	Student Observer	MIIS/MBNMS
Griffeth, Ian	M	Technician/Pilot	Nuytco
Guardino, Mike	M/USA	Teacher At Sea	Carmel High
Kristoff, Emory	M/	Photos	SSE

Mead, Gale	F/USA	Mission Log Ed.	SSE
O'Toleran, Phil	M	Technician/Pilot	Nuytco
Prover, Steve	M	Technician/Pilot	Nuytco

7.5 MEDICAL FORMS

All personnel participating on board will complete a NOAA health Services Questionnaire prior to embarking on the vessel. Forms will be completed and submitted to the Commanding Officer per NOAA Corps Instruction 6000.

Summary of personnel sleeping aboard *McArthur* for MBNMS SSE
(F=female, M=male -- require a berth aboard *McArthur* that night)

Personnel Onboard	5/8	5/9	5/10	5/11	5/12	5/13	5/14	5/15	5/16	5/17	5/18	5/19	5/20	5/21	5/22
	Transit	Training		MBARI		SSE		Big Creek			Education		Prickly	Sharks	S.B.
Cailliet, Greg												M	M		
Cava, Francesca					F	F					F				
Clark, Kit											F	F	F		
deMarignac, Jean							M	M	M	M					
deMarignac, Lisa							F	F	F	F					
DeVogelaere, Andrew											M	M	M		
Douros, William	M	M	M	M	M	M	M	M	M	M	M	M	M		
Earle, Sylvia					F	F					F				
Evans, Kip			M	M	M	M	M	M	M	M	M				
Giffen, Jason												M	M		
Guardino, Mike	M	M									M				
Harrold, Chris	M	M										M	M		
Harvey, James							M	M	M	M					
Kristoff, Emory					M	M									
Lea, Bob							M	M	M	M					
Marinovic, Baldo											M	M	M		
Mead, Gail		F	F	F	F	F									
Maher, Norm													M		
NUYTCO Griffeth, Ian		M	M	M	M	M	M	M	M	M	M	M	M	M	M
NUYTCO O'Toleran,	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M
NUYTCO Prover, Steve	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M
Reisenbichler, Kim	M	M	M	M											
Robison, Bruce	M	M	M	M	M	M									
Starr, Rick	M	M	M				M	M	M	M		M	M		
Webster, Steve	M	M									M				
Yoklavich, Mary	F	F					F	F	F	F					
Total F	1	2	1	1	3	3	2	2	2	2	3	1	1	0	0
Total M	9	10	8	7	7	8	9	9	9	9	9	10	11	3	3
Total	10	12	9	8	10	11	11	11	11	11	12	11	12	3	3

as of May 7, 1999

8.0 DATA RESPONSIBILITIES

8.1 DATA AND SAMPLES

8.1.1 The Chief Scientist via the Mission Coordinator is responsible for the data quality, disposition, and archiving of data and samples collected aboard the ship for the primary project. As the representative of the cruise sponsor, the Chief Scientist is also responsible for the dissemination of copies of these data to participants on the cruise and to any other requesters.

8.1.2 The Commanding Officer will give the acting Chief Scientist a single copy of all data collected by ship's personnel. The ships Scientific Computer System (SCS) will collect data continuously during the project. The SCS data will be provided to the Chief Scientist at the completion of the project. The Chief Scientist will provide the Commanding Officer a list of all data collected by the scientific party.

8.1.3 the Commanding Officer is responsible for all data collected for ancillary projects until those data have been transferred to the projects' Principal Investigator.

8.2 RECORDS AND REPORTS

8.2.1 Marine Operations Abstract (MOA). McARTHUR's officers will maintain the MOA during the cruise. The ship's position will be entered for all operations, and otherwise every 30 minutes or when changing course or speed. The Commanding Officer will give the Mission Coordinator a copy of the MOA at the completion of the project.

8.2.2 Pre Dive forms will be used to check out the sub prior to each dive and are the responsibility of the pilot and dive crew. Pre Dive forms will be signed by the Dive Supervisor.

8.2.3 Dive Logs will be used to keep track of the subs performance during each dive and are the responsibility of the Dive Supervisor or designee.

8.2.4 The Mission Coordinators Log will provide an accounting of the project work being conducted during each dive and are the responsibility of the Mission Coordinator.

8.2.5 The Mission Log will be based on a compilation of materials collected during dive operations (audio, video, photographs) and information collected post-dive (text provided by pilots), and will be posted on the NGS SSE Web site. The Mission Log is the responsibility of the Mission Log Coordinator.

8.2.6 The Mission Coordinator will complete the Ships Operations Evaluation Form and forward to the Office of NOAA Corps Operations.

8.2.7 All film collected during the cruise will be handled in accordance with the MOU between NOAA and NGS.

9.0 EQUIPMENT LISTS

9.1 SUPPLIED BY THE SCIENTIFIC PARTY:

(A)

Internal still camera--to be provided by P.I.

Internal digital video camera--to be provided by P.I.

9.2 SUPPLIED BY THE McARTHUR:

(A)

Equip Sub: Parallel laser beams
External digital camera
Internal audio recorder
dGPS to navigate for transects
Internal still camera--to be provided by the P.I.

Internal digital video camera--to be provided by P.I.
Equip Ship: Acoustic doppler current profiler--built in on *McArthur*
Thermosalinograph--built in on *McArthur*
Rack and desk in chart room
Conducting wire
Echo sounder rack

10.0 ADDITIONAL AND ANCILLARY PROJECTS

10.1 ADDITIONAL PROJECTS: Any other work done during the cruise period will be subordinate to the main project and performed so as to not interfere with that outlined in these instructions. The Chief Scientist will be responsible for determining the priority of additional work relative to the main project.

10.1.2 These are projects related to the cruise, but not to SSE. Such projects are to be conducted at night or during extended down times of the SSE. Examples include side-scan sonar or net tow operations. Please use the following format to provide information on these projects:

Project Title: Krill studies
Principal Investigators: Baldo Marinovic and Don Croll
Objective: Use nets to survey krill populations, correlate them to critical marine mammal habitats
Task: Net tows, bongo.
Location: General Monterey Bay area
Equip Ship: -
Equip Scientific Party: Nets

10.2 ANCILLARY PROJECTS: Ancillary projects are secondary to the objectives of the cruise, should be treated as additional investigations, do not have representation aboard, and are accomplished by the ship's force.

10.2.1 Ancillary tasks will be accomplished in accordance with the NOAA Fleet Standing Ancillary Instructions.

11.0 MISCELLANEOUS

11.1 Navigation Control: Shipboard DGPS provided for vessel. Submersible navigation provided by NUYTCO

11.2 Required Compliance: The Chief Scientist will require each Mission Coordinator to contact local authorities to increase the safety and awareness of the operations. These authorities include :

11.2.1 US Coast Guard Station responsible for the area of coverage in the cruise instructions.

11.2.2 Local Notice to Mariners in the district concerning the area covered in the cruise instructions.

11.2.3 Port Authority or Harbor master for potential dive sites.

11.2.4 John Smiley, Manager of the Big Creek Ecological Reserve

11.3 Meals for all scientific party members will charged to the host organization in accordance with NOAA Administrative Order 203-100. The Chief Scientist will provide the Commanding Officer with the appropriate accounting codes.

11.4 Pre-Cruise Meeting: A pre-cruise meeting between the Chief Scientist, the Commanding Officer, the Mission Coordinator, and the Dive Supervisor will be held prior to the commencement of operations to do a final review of the cruise plan.

11.5 Post-Cruise debrief: A post-cruise debriefing between the Chief Scientist, the Commanding Officer, the Mission Coordinator, the Dive Supervisor, and the Mission Coordinator for the next site will be held to review any problems that occurred.

11.6 HAZMATS

12.0 COMMUNICATIONS

12.1 McARTHUR will communicate daily, Monday through Friday, with the Pacific Marine Center. Normally this will be via message, but radio contact will be maintained when possible.

12.2 Because the scientific staff must sometimes communicate with other research vessels, commercial vessels, and shore-based NOAA facilities, the Chief Scientist or his designee may request the use of radio transceivers aboard the vessel.

12.3 McARTHUR is equipped with INMARSAT and cellular telephone. The Chief Scientist may need access to these systems with permission from the Commanding Officer. The Commanding Officer will provide the Chief Scientist with a log of all calls made from the ship by the scientific party at the completion of the project.

13.0 APPENDICES

(A) List of Coordinates for tracklines or stations.
(B) Chartlets
(C) Emergency Contact phone number